Chapter 7. Property Protection

Property protection measures are those steps taken to protect individual properties, rather than neighborhoods or larger areas of the Village. Most property protection measures modify the land or the building so floodwaters will inflict little or no damage. Property protection measures may be the only feasible flood protection approach in less densely developed areas where a formal flood control project is not feasible. They are also appropriate as interim measures pending construction of a flood control project.

Property protection measures are normally implemented by the property owner, although in many cases technical and financial assistance are provided by a local, state, or federal agency. There are eight categories of property protection measures that were reviewed by the Flood Liaison Committee:

7.1 Relocation
7.2 Acquisition
7.3 Elevation
7.4 Floodwalls
7.5 Dry Floodproofing
7.6 Wet Floodproofing
7.7 Sewer Backup Protection
7.8 Flood Insurance

Most of these measures have been implemented in the south suburban area. As part of its review of property protection, the Flood Liaison Committee visited several sites, including two in South Holland.

The Committee also investigated ways to assist property owners who could use more information or financial assistance in implementing their own protection measures. Provisions regarding information and technical assistance are covered in Chapter 8, Public Information. Financial assistance is addressed in Section 7.9.

7.1 Relocation

7.1.1 General: The surest and safest way to protect a building from flooding is to move it to high ground. There are many house movers in the Chicago area and any type of building can be moved. However, the cost increases for heavier (e.g., masonry) buildings and for large or irregularly shaped buildings.

Flood Hazard:

- Relocation protects a building from any type of flood hazard.
- Relocation is more justified in areas subject to ice jams, flash flooding, deep waters or other severe flood hazard.

Building Types:

- Smaller, wood frame buildings.

- Buildings on crawlspaces or basements where it is easier to place jacking and moving equipment underneath.
- Large lots with portions outside the floodplain or where the owner has a new flood-free lot available.

Cost: The cost could exceed to over $90,000 depending on the type, weight and size of the house, whether it must be cut and moved in parts, and the cost of a new lot.

Problems:

- Expensive for the individual property owner, although there are some government loans or grants available.
- If a large area is affected, the community loses property tax and utility income.

7.1.2 Use in the Area: Many buildings have been moved in the Chicago area. However, there is little documentation of moving a house to get it out of the floodplain. There have been floodplain relocation projects in downstate Illinois and in other states.

7.2 Acquisition

7.2.1 General: Acquisition has all the advantages of relocation. The major difference is that the building is undertaken by a government agency and the land is converted to public use. Acquisition and demolition are done more often for larger, slab, or masonry buildings that are too expensive to move and for dilapidated structures that are not worth protecting.

There have also been cases of acquisition and relocation, whereby the purchasing agency sells the building for salvage and the new owner relocates the structure rather than demolish it. Sometimes arrangements are made to allow the previous owner to purchase the building back at the salvage value. The owner then gets to keep the house and use the rest of the money made from the sale to pay for the new lot and moving expenses.

Flood Hazard:

- Acquisition works in any type of flood hazard.
- Acquisition is more justified in areas subject to ice jams, flash flooding, deep waters or other severe flood hazard.

Building Types:

- Appropriate for any type of building.
- Areas where the community wants to clear or redevelop because of building conditions.
- Areas where parks are needed and areas that are adjacent to existing parks.

Cost:

$142,000	median sale price of a single family home
8,400	appraisals, abstracts, title opinions, and other fees
13,500	relocation benefits
,000	demolition
$180,900	

Problems:

- Many people don't want to leave their property, often because they prefer a waterfront location.
- A "checkerboard" acquisition pattern leaves holes that break up the neighborhood (see Figure 7-1).
- The properties acquired by the community become an added maintenance cost to the taxpayer.
- If a large area is affected, the community loses property tax and utility income.

Figure 7-1 Acquisition Pattern

This aerial photo shows the checkerboard pattern in the buyout area along the Little Calumet River in Calumet City.

7.2.2 Use in the Area: There are several excellent examples of acquisition in the Chicago area. One of the largest in the country was implemented between Addison and Elmhurst in the early 1970's. Over 150 acres were purchased and 75 families were relocated out of the Salt Creek floodplain. The area was redeveloped by the Forest Preserve District and part of the land was used to build a levee to protect properties not purchased.

In the 1980's, one of the more commonly used programs was FEMA's Section 1362, which funded acquisition of substantially or repeatedly damaged buildings that were insured under the National Flood Insurance Program. Section 1362 was used to purchase homes in Calumet City. This resulted in the checkerboard pattern where only a few lots here and there were acquired and cleared (Figure 7-1).

Section 1362 has been replaced by other funding programs, especially since the 1993 Mississippi River flood. The Village applied for funding following the 1996 flood to acquire a repetitive flooded commercial structure. However, state rules allowed only funding of residences, so the project was not approved.

In 2015, the Village of Glenwood was selected for funding through FEMA's Flood Mitigation Assistance Program for acquisition and demolition of nine homes in the Thorn Creek floodplain.

MWRDGC has a Flood-Prone Property Acquisition Program, which involves partnerships with local communities to acquire flood-damaged and flood-prone homes within the floodplain on a voluntary basis. MWRDGC is currently working with several communities to acquire flood-prone homes, which will be removed from the floodplain and preserved as open space. Communities are selected for this acquisition program through an annual application process.

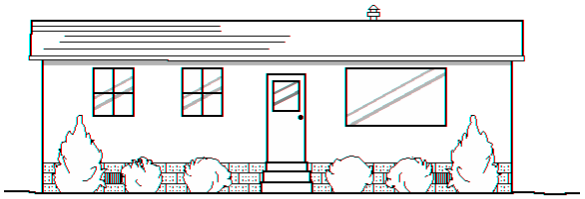
7.3 Elevation

7.3.1 General: Short of removing it from the floodplain, the best way to protect a house from surface flooding is to raise it above the flood level. Floods flow under the building, causing no damage. This protection technique is required by law for new buildings located in floodplains and is commonly practiced in flood-prone locations throughout the country.

House moving contractors know the techniques to elevate a building. The building is jacked up and set on cribbing while a new foundation is built underneath. The foundation walls are raised to the flood protection level and the house is lowered back down. Utility lines are extended and reconnected, steps are built, and, sometimes, the perimeter is backfilled or landscaped to mask the change.

If the flood protection level is low, the result is similar to a house on a two or three-foot crawl-space (see Figure 7-2). If the house is raised two feet, the front door would be three steps higher than before. If the house is raised eight feet, the lower area can be wet floodproofed for use as a garage and for storage of items not subject to flood damage.

Figure 7-2 Elevated House



A variation on elevating the entire building is filling in a basement, which "relocates' the lowest floor to a level 8 – 9 feet higher. This occurred when a South Holland home in the floodplain had a fire that caused substantial damage. The owner built a second story and moved everything out of the basement. The basement was filled in. The first floor was already above the regulatory flood elevation, so the house was compliant with the floodplain management regulations and the owner pays lower flood insurance premiums.

Flood Hazard:

- Elevation is appropriate for slower moving surface and subsurface water.
- Buildings can be elevated to flood protection levels up to eight feet.
- Elevation is appropriate where there is no time for human intervention.

Building Types:

- Lighter, wood frame buildings on crawl spaces or basements are the easiest to elevate because jacks can readily be placed under them.
- Masonry buildings on crawlspaces can be readily elevated but the cost is increased because of the weight and the care needed to keep the brick or stone from cracking or falling off.
- Buildings on slab can be elevated, slab and all, but the number of knowledgeable contractors is limited.

Cost: Crawlspace: $28,000 - $56,000. Slab with brick walls: $56,000 - $112,000. Costs do not include design or permit fees. Projects managed by the property owner have cost as little as $5,000.

Problems:

- Many owners object to the change in appearance. If no one else in the neighborhood has elevated their building, they are concerned that they will stand out and the project will affect area property values.
- New lower stories created by raising buildings eight feet are sometimes reoccupied with contents and materials susceptible to flood damage.

7.3.2 Use in the Area: There have been several homes elevated in the floodplains of Salt Creek and the Kankakee and Des Plaines Rivers. These have been raised from two feet to eight feet. In some cases, separate and attached garages were left at grade. Most of these were financed by the property owners. A well-landscaped example is on 158th Street just east of Greenwood Road.

7.4 Barriers

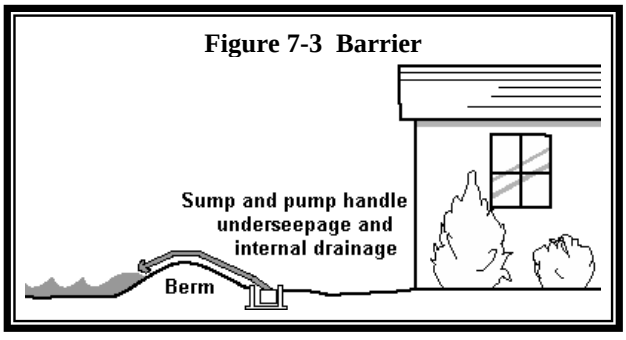
7.4.1 General: Barriers keep floodwaters from reaching a building. They can be made of earth or concrete. Large earth barriers are called levees. The term "berm" is used in this report and is the more common approach in shallow flooding areas. Berms are made by regrading or filling an area (see Figure 7-3). Barriers can either surround the building ("ring levee") or connect to high ground.

The strength of levees comes from their mass; therefore, they need a lot of room. The standard design is three horizontal feet for each vertical foot (3:1 slope). Providing a foot width at the top results in a need for six to seven feet of ground for each foot in height.

Concrete floodwalls are used where there is not enough room for a berm or levee. They should be built with internal reinforcing bars for strength and to resist cracking and settling over time. They must be properly anchored to withstand lateral hydrostatic pressure and care must be taken to ensure they are watertight.

All three approaches need to handle leaks, seepage of water under the barrier, and rainwater that falls inside the levee or floodwall perimeter. Therefore, they need a sump and/or drain tile to collect the internal ground and surface water (Figure 7-3). A pump and pipe is also needed to pump the internal drainage over the barrier.

Figure 7-3 Barrier



By keeping water away from the building walls, the problems of seepage and hydrostatic pressure are reduced. Basements and the lower floors of split levels can also be protected by construction of low walls around stairwells.

Flood Hazard:

- Levees and floodwalls can be built up six feet high, but are more common, less obtrusive, and safer where the flood protection level is three feet or less.
- Levees and berms are susceptible to erosion in areas with high velocities.
- Some barriers have openings for driveways and sidewalks. Closing these openings is dependent on human intervention.
- Care must be taken to set a barrier back on the property so that drainage problems are not diverted to neighboring properties.

Building Types:

- Any type of building can be protected, although buildings with basements will be more susceptible to underseepage.
- Floodwalls are more appropriate on small lots where there is less room.

Cost: The cost can range from practically nothing, when the homeowner regrades the yard or builds a berm with local fill, to $12,000 for a concrete floodwall three feet high with drain tiles and sump pump. One wall around a patio in South Holland cost $3,000 to protect to less than the 100-year flood level.

Problems:

- Levees and berms are susceptible to erosion from rain and floodwaters if not properly sloped and provided with ground cover.
- Levees, berms, and floodwalls can settle over time, lowering their protection levels. Concrete walls can crack, weaken, and lose their watertight seal.
- Barriers are not allowed in floodways or other areas where the obstructions would divert floodwater to other properties.

7.4.2 Use in the Area: There are several examples of barriers in the area. There is a small berm on 164th Street in Calumet City between a home and a park on the Little Calumet River. A good part of the berm appears to be on park land. A small concrete floodwall protects a house on Burnham Avenue in Calumet City, just north of the Little Calumet River (Figure 7-4).

A more sizeable ring levee protects two houses on 158th Street just east of South Holland. The Liaison Committee visited this site on a field trip. The levee is six feet in the back and three feet in the front. It has successfully kept out floodwaters since it was built after the 1981 flood of the Little Calumet River.

Figure 7-4 Local Barriers

This Calumet City home is surrounded by a floodwall, but the garage door must be sandbagged during a flood. The wall doubles as a planter box to reduce the visual impact of a flood protection structure.

This floodwall was installed by a South Holland home-owner on the Calumet Union Drainage Ditch. It has kept floodwaters out of the house multiple times since it was built in 1991.

There are interesting different approaches to floodwalls that protect below grade garage entrances in Oak Forest. The Committee visited examples that use a wooden barrier and that require the vehicle to drive over a raised area in the front yard or a raised sidewalk.

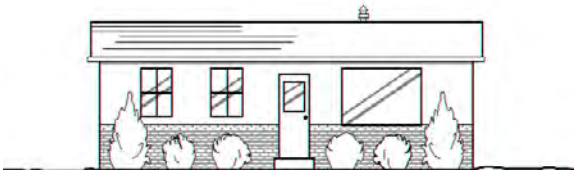
7.5 Dry Floodproofing

7.5.1 General: This term covers several approaches to sealing up a building to ensure that floodwaters cannot get inside it. All areas below the flood protection level are made watertight. Walls are coated with waterproofing compounds or plastic sheeting. Openings, such as doors, windows, sewer lines, and vents, are closed, either permanently, with removable shields, or with sandbags. Many dry floodproofed buildings cannot be told apart from those that have not been modified.

Dry floodproofing is only appropriate for buildings on sound slab foundations that are subject to less than three feet of water. Because there is a joint between the slab and the foundation wall, the foundation cannot be considered watertight. A subsurface drainage system with a sump pump is needed in areas where flood waters are up for several hours.

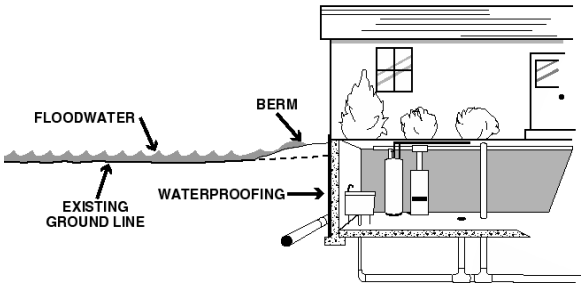
The degree of floodproofing can vary from simply applying a waterproofing compound on the walls and sandbagging the doorways to a more secure method. The more secure method involves coating the lower three feet of the outside walls with waterproofing compounds and plastic sheeting. This coating is covered with a layer of brick facing to protect the waterproofing and to minimize any disruption to the appearance. If not already installed, a drain tile with a sump and sump pump is needed at the base of the walls to handle underseepage.

Figure 7-5 Dry Floodproofed House



Small brick-faced floodwalls are built around the doorways to allow access into the house during flooding. The drain tile sump and a sump pump are located inside the wall. The walls have watertight doors that stay closed, requiring human intervention to open them.

This approach assumes that the slabs are not broken or cracked. To ensure that they are watertight and sound, an engineering analysis is needed. The end result is a watertight house that will keep water out even when there is no one home.Houses with basements or other floors below grade can be protected with a backfill approach. A waterproofing compound is applied to the walls and fill is placed against the side of the house. A subsurface drain tile and one or two sump pumps are a must. Water must seep through the fill to reach the house. The drains and pumps can keep up with the seepage.**Figure 7-6 Backfill Floodproofing**



By backfilling above the flood protection level, a house with a basement can be protected from shallow flooding. The basement walls need to be waterproofed and a drain tile and sump pump is needed to keep water pressure from building up. This approach was used to protect the South Holland home to the right.

The secret is to not let surface water touch the house. This will greatly increase the amount of water against the basement walls, resulting in much greater hydrostatic pressure. Sump pumps cannot keep up with surface water. An example of this backfill or waterproofing berm approach is in Figure 7-6.

Flood Hazard:

- Dry floodproofing without a backfilled berm is appropriate where the flood protection level is less than three feet deep. Most building walls and floors are not strong enough to withstand the hydrostatic pressure from more than three feet of water.
- The three feet depth guideline assumes there is little velocity.

Building Types:

- Dry floodproofing is only appropriate for buildings with slab on grade foundations. It is very difficult to waterproof a crawl space to protect it from underseepage.
- Dry floodproofing without backfill is not recommended for houses with floors below grade, such as basements and garden apartments, because the hydrostatic pressure can collapse the walls or buckle the floor.
- Where there is not enough space on the lot for a berm or levee, dry floodproofing may be the only alternative. This technique is not as desirable as keeping floodwaters from reaching the building.

Cost: An owner can install a dry floodproofing approach for very little money. The cost ranges from $100 for the waterproofing compound/sandbag approach to $22,000 for the more secure/attractive approach described. The project in Figure 7-6 cost approximately $10,000.

Problems:

- Closing openings is dependent on adequate warning and the presence of someone who knows what to do.
- Many commercial waterproofing compounds are made to protect wood from rain and will not withstand the pressures of standing water. Some deteriorate over time.
- It is very tempting for the owner to try to keep the flood out if floodwaters get deeper than 2-3 feet. This can result in collapsed walls, buckled floors, and danger to the occupants.

7.5.2 Use in the Area: There is one well-documented case in Calumet City of an owner who applied a little over $100 worth of plastic and waterproofing compound to the lower levels of brick on his slab house (Figure 7-7).

There are probably many other cases of dry floodproofing that we are unaware of because they don't always show. One measure that does show is glass bricking the basement windows. However, this approach is not recommended because of the loads placed on the basement walls. The backfill approach is preferred because pumps keep the seepage water from building up the hydrostatic pressure.

The backfill approach has been used by one of the Flood Liaison Committee members. The owner built a waterproofing berm combined with landscaping, timbers, and concrete that protects his house with a below grade floor. This site was visited by the committee members on the field trip (Figure 7-6).

Figure 7-7 Dry Floodproofed House in Calumet City

This project kept water out during the 1982 flood and proved that it was one of the most cost effective floodproofing projects ever made. While the waterproofing compound left a black strip over the lower rows of brick, it was hidden by planting and landscaping in the front and side yards.

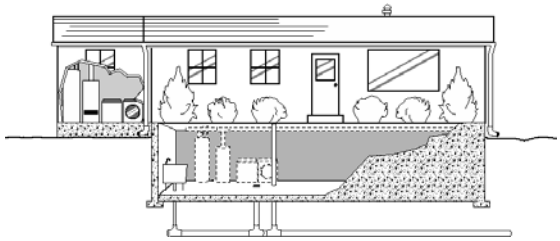
7.6 Wet Floodproofing

7.6.1 General: Outside floodwaters against a basement put the equivalent pressure of seven feet of water on the wall and floor. Most walls and floors are not built to withstand hydrostatic pressure of more than three feet of water. As a result, sometimes waterproofed basement walls and floors are cracked, buckled, or broken by the pressure of floodwater.

One way to deal with this is to plug the sanitary sewer openings, such as the floor drain, and let the surface water in. Everything subject to water damage must be moved up or out of the building. This is called wet floodproofing. Wet floodproofing approaches range from moving a few valuable items to rebuilding the floodable area.

In the latter case, structural components below the flood level are replaced with materials that are not subject to water damage. For example, concrete block walls are used instead of wooden studs and gypsum wallboard. The furnace, water heater, and laundry facilities are permanently relocated to a higher level. In Figure 7-8, these items are relocated to a new room addition. Another approach is to raise these items on platforms where the flooding is not deep.

Figure 7-8 Wet Floodproofed House



Wet floodproofing is not feasible for one story houses because the flooded areas are the living areas. However, many people wet floodproof their basements, garages, and accessory buildings simply by relocating all hard to move valuables, such as heavy furniture and electrical outlets. Light or moveable items, such as lawn furniture and bicycles can be moved after the flood warning is issued.

Wet flood proofing has one advantage over the other approaches: no matter how little is done, flood damage will be reduced. Thousands of dollars in damage can be prevented by simply moving furniture and electrical appliances out of the flood-prone area.

Flood Hazard: Wet floodproofing will work wherever there is an area above the flood protection level to which things can be relocated or temporarily stored.

Building Types:

- Buildings with basements.
- Garages, sheds, commercial and industrial facilities, and buildings with contents that are either water resistant or easily moved.

Cost: One hour of the owner's time will accomplish some wet floodproofing by moving valuables out of the floodable area. The out of pocket cost can range to $3,000 for relocating the furnace, water heater, etc., to as high as $22,000 to rebuild a floodable area with water-resistant materials and to relocate all utilities. This cost can be minimized if the work is done as part of building improvements or during reconstruction after a flood.

Problems:

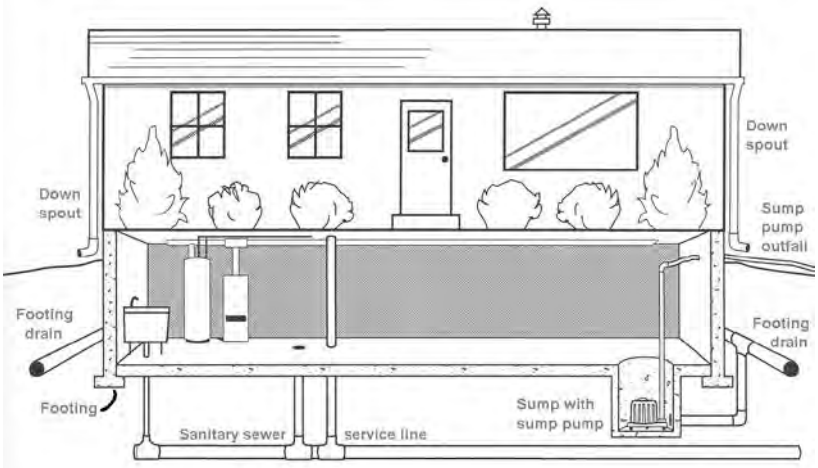
- Owners are reluctant to "abandon" large areas of their buildings.
- Moving contents is dependent on adequate warning and the presence of someone who knows what to do.
- Flooding an area where there is electricity or hazardous materials creates a safety hazard.
- There will still be a need for clean up, with its accompanying health problems.

7.6.2 Use in the Area: As with dry floodproofing, it is very hard to tell if a house has been wet floodproofed. There have been a few Chicago area cases documented. A Wood Dale resident elevated his house and wet floodproofed the attached garage so it didn't have to be elevated. An Oak Forest homeowner wet floodproofed the lower level of his bi-level house rather than suffer any more flood damage.

7.7 Sewer Backup Protection

7.7.1 General: Figure 7-9 shows the sewer arrangements for a typical house in South Holland. The sanitary sewer service line drains toilet waste, laundry tubs and the basement floor drain to the sanitary sewer main in the street. Clean storm and ground water is handled by downspouts and footing drains. This water is directed either to a storm sewer service line (pictured) or to a sump where a pump sends it out onto the ground away from the house.

Figure 7-9 Typical House Sewer Arrangement



Often basement flooding is caused by these two sewer systems being interconnected. Some houses have the downspouts, footing drain tile, and/or the sump pump connected to the sanitary sewer service. During a heavy rain, excessive amounts of stormwater enters the sanitary sewers, causing backups in the owner's house and overloading the mains, contributing to backups in other houses. Correcting these problems are part of the Village's ICAP programs which is discussed in Section 4.5.2. To date, most of the downspout, sump pump and other improper cross-connections have been disconnected.

Sewer backups can also be caused by events not related to storms or flooding. Individual service lines can be plugged by grease, waste, tree roots, breaks in the pipe or saturated ground. The Village's mains can also be plugged by the same causes as well as vandalism or illegal placement of items in manholes. These problems can be fixed by the owner or the Village, depending on where the stoppage occurs. Proper maintenance, such as pouring tree root killer down the toilet every year, can prevent most of these problems.

This section focuses on property protection measures that deal with sanitary sewer backup which occurs when the sewer main is overloaded and backs up through the sanitary service line into the house. There are four common approaches addressed in this section: floor drain plug, floor drain standpipe, overhead sewer, and backup valve. These all work for the same flood hazard and building type (buildings with basements or below grade floors), so those headings are not repeated in this section.

7.7.2 Floor Drain Plug: The simplest way to stop sewer backup is to plug the opening where it first occurs. This is at the floor drain, the sanitary sewer system's lowest opening in the house. Commercial plugs are available which are placed in the floor drain below the grate. Bolts on metal end pieces are tightened, causing a rubber gasket to expand and seal the plug in the pipe.

A plug stops water from flowing in either direction. Therefore, if the laundry tub overflows or other spillage occurs, it will stay in the basement unless the plug is removed. Conversely, the plug can be left out and put in place during heavy rains.

Figure 7-10 Floor Drain Float Plug

One variation on the plug is one with a float. This plug allows water to drain out of the basement (see Figure 7-10, left side). When the sewer backs up, the float rises and plugs the drain (see Figure 7-10, right side). A float plug does not need to be removed and replaced in order for the floor drain to work.

Cost: The great advantage of a plug is its low cost and ease of installation. A standard floor drain plug can be purchased at most local hardware stores for approximately $5. A float plug costs $10 - $15.

Problems:

- A plug left in the floor drain may contribute to a wet basement if spillage cannot drain out.
- A small amount of debris can jam a float plug open, preventing it from sealing.
- A floor drain plug does not stop backup from coming out of the next lower opening, such as a laundry tub or toilet in the basement.
- A plug does not tell you if there is a problem occurring in your sewer service line. If the plug is not tight enough, pressure can eject it.
- In older houses, the sewer lines under the basement floor may be clay tile. A build up of pressure can break them. In newer houses, the sewer line under the floor is cast iron, making breakage unlikely.

7.7.3 Standpipe: A standpipe is an inexpensive alternative to a floor drain plug. A "donut" with metal end pieces and a rubber gasket in the middle is placed in the floor drain. A length of pipe is placed in the "donut hole." Bolts are tightened and the metal end pieces squeeze the gasket to make a tight seal on both the floor drain and the length of pipe.

Figure 7-11 Standpipe

When the sewer backs up, the water stays in the pipe (see Figure 7-11). Unlike a pipe, water pressure will not blow a properly installed standpipe out of the floor drain. The system works unless the backup is so deep that it goes over the top of the pipe.

One advantage of the standpipe over the floor drain plug is that the overflow acts as a safety valve. A flooded basement equalizes water pressure on the walls and floor, minimizing the chance of a cracked floor from broken pipes underneath.

However, because water pressure is dependent on the "head" or height of water in the pipes, a standpipe does not reduce the pressure in the pipes. The water pressure in the pipes is the same with a standpipe or a plug. Therefore, standpipes and plugs are only recommended for buildings where the sewer line underneath the floor is cast iron pipe.

Cost: A standpipe is almost as inexpensive as a floor drain plug. The "donut" can be purchased for $20 - $30. The pipe can be cut to any length and will cost less than $10.

Problems:

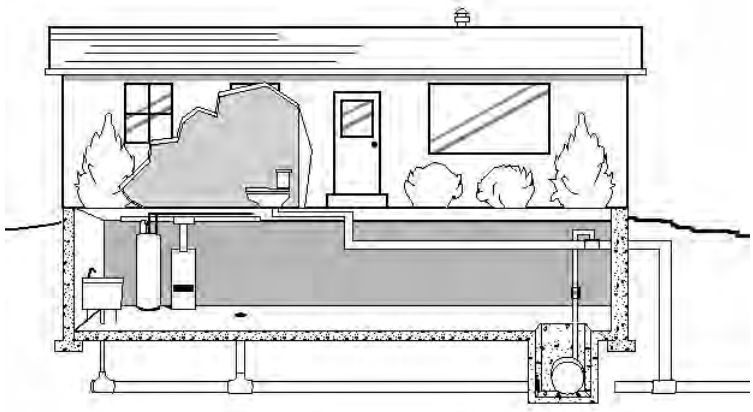
- A standpipe left in the floor drain may contribute to a wet basement if spillage cannot drain out.
- A standpipe only protects up to its height, normally three feet. Deeper flooding will flow over the top.
- A standpipe does not stop backup from coming out of the next lower opening, such as a laundry tub or toilet in the basement.
- In older houses, the sewer lines under the basement floor may be clay tile. A build up of pressure can break them. In newer houses, the sewer line under the floor is cast iron, making breakage unlikely.

7.7.4 Overhead Sewer: An overhead sewer acts like a standpipe but without the problems. A sump is installed under the basement floor to intercept sewage flowing from basement fixtures and the basement floor drain. An ejector pump in the sump pumps sewage up, preferably above ground level. Plumbing fixtures on the first floor are not affected. They continue to drain by gravity to the sewer service line.

It is unlikely that the sewers will backup above ground level. If water does go higher, a check valve in the pipe from the ejector pump keeps it in the pipes. Backed up sewage is contained in the sewer pipes so there is no worry about overflowing laundry tubs or basement toilets.

Another advantage is that one does not have to be home during the storm because an overhead sewer

Figure 7-12 Overhead Sewer



is a permanent alteration to the plumbing. The only concern is when power is lost, the ejector pump won't work. This only limits the use of the facilities in the basement that need the pump. Upstairs plumbing still works.

Cost: While more dependable than a standpipe, an overhead sewer is more expensive, typically costing $5,500 to $17,000 for a plumbing contractor to reconstruct the pipes in the basement and install the ejector pump.

Problems:

- The ejector pump requires maintenance and electricity to work properly.
- The basement is disrupted during construction. The contractor may have to run the overhead pipes through one or more basement rooms, although often they can be camouflaged.
- In older houses, the sewer lines under the basement floor may be clay tile. A build up of pressure can break them. Sometimes this can be accounted for by running the overhead line through the basement wall. In newer houses, the sewer line under the floor is PVC, making breakage unlikely.

7.7.5 Backup Valve: A backup valve stops the water in the sewer pipes. Older versions of this approach were located in the basement and relied on gravity to close the valve. If debris caught in the flapper, the valve did not close tight. Because of its unreliability, valves were discouraged and even prohibited in some communities.

The "balanced valve" has corrected these design shortcomings. A system of counterweights keeps it open all the time so debris won't catch and clog it. When the sewer backs up, instead of relying on gravity, floats force the valve closed. It is usually installed in a manhole in the yard so there is less disruption during construction and no concerns over breaking the pipes under the basement floor.

As with overhead sewers, a valve is fully automatic. It can even work when there is surface flooding. The installation is outdoors, so there is minimal disruption of the basement during construction. The owner can still use the sanitary sewers during flooding as long as there is power to run the ejector pump which ejects wastewater when the valve is closed.

Cost: Area companies can install an outside backup valve at a cost from $5,500 to $12,000.

Problems:

- The ejector pump and the valve require maintenance.

7.7.6 Use in the Area: Because plugs and standpipes can be purchased anywhere and because they are installed indoors, there is no way to tell how many are in use in South Holland or the south suburbs. However, many residents are familiar with standpipes and many use them.

Overhead sewer installation and backup valves require a knowledgeable plumber and a building permit. The Village's rebate program (see Section 7.9.5) has funded 135 overhead sewer installations and 56 backup valves.

7.8 Insurance

Insurance helps the owner finance repairs and replacements after a flood, and insurance has the advantage that a property is covered as long as the policy is in force. The owner does not have to be home for this approach to work. Most homeowner's insurance policies do not cover a property for flood damage. However, there are two ways an owner can insure a house.

7.8.1. National Flood Insurance: The Village of South Holland participates in the National Flood Insurance Program (NFIP). Local insurance agents can sell a separate insurance policy under rules and rates set by the Federal Insurance Administration. Any agent can sell a policy and all agents must charge the same rates. Rates do not change after claims; they are set on a national basis.

Separate coverage can be obtained for the building's structure and for its contents. The structure generally includes everything that stays with a house when it is sold, including the furnace, cabinets, built-in appliances, and wall to wall carpeting. There is no coverage for money, valuable papers, and items outside the house, such as the driveway and landscaping.

A National Flood Insurance policy covers damage to contents in a basement only under special circumstances. Structural coverage only covers the structural parts of basement walls and floor (not finishings like paint, wallpaper, or paneling) and selected items such as the furnace, water heater, washer, sump pump, etc. The lower level of a split level is considered a basement.

Flood Hazard:

- Flood insurance covers a building subject to a "general condition of surface water flooding." Coverage is appropriate regardless of the velocities, duration, warning time, etc.
- The NFIP does not insure buildings for subsurface flooding, including seepage and sewer backup.

Building Types: Any walled and roofed structure can be covered by a flood insurance policy. Detached garages and accessory buildings are covered under the policy for the lot's main building.

Cost: The cost of a flood insurance policy for a home built before August 1980 varies and is dependent on the amount of coverage to be provided and the location and type of house. In South Holland, preferred risk policies are available for properties located outside the 100-year floodplain (as shown on the Flood Insurance Rate Map). The annual premiums for these policies are typically substantially lower than the premiums for homes that are in the floodplain. Premiums typically include a deductible for the structure and a separate deductible for the contents of the structure. Higher deductibles are available to reduce the cost of the premium.

Use in the Area: In 1999, the Village had over 1,100 policies, ranking it fourth in the state. With the new Flood Insurance Rate Map, the floodplain where lenders must require a flood insurance policy is much smaller. As of March 2010, there were 392 policies in force for a total of $71,537,900 in coverage. As of January 2017, there were 121 policies in force for a total of $30,307,800 in coverage

Participation in the Community Rating System provides South Holland residents a 25% reduction in their premium rates (see Section 1.4).

7.8.2. Basement backup insurance: Several insurance companies have sump pump failure or sewer backup coverage that can be added to a homeowner's insurance policy. Each company has different amounts of coverage, exclusions, deductibles, and arrangements. Most are riders that cost extra. Most exclude damage from surface flooding that would be covered by National Flood Insurance.

Flood Hazard:

- Subsurface flows from sump pump failure.
- Sewer backup.

Building Types: Any building with a basement or floor below grade would benefit, especially buildings in combined sewer areas.

Cost: Varies per individual property for a rider on the homeowner's insurance premium.

Problems: Each company has its own deductibles and exclusions. Some may cancel the coverage or increase the premium if the policy holder collects on a claim.

7.9 Financial Assistance

7.9.1 Federal Grants: Congress has created a variety of funding sources to help floodprone property owners reduce their exposure to flood damage. Because the Village participated in the 2014 Cook County Hazard Mitigation Plan, they are now eligible to apply for FEMA grants, such as the Flood Mitigation Assistance and Pre-Disaster Mitigation grants. More information on the following programs can be found on the noted websites and in Figure 7-13.

- Hazard Mitigation Grant Program (HMGP) − a grant made available after a Presidential disaster declaration (https://www.fema.gov/hazard-mitigation-grant-program)
- Flood Mitigation Assistance (FMA) − a grant that a community can apply for each year (https://www.fema.gov/flood-mitigation-assistance-grant-program)
- Pre-Disaster Mitigation (PDM) − a nationally competitive grant that a community can apply for each year (https://www.fema.gov/pre-disaster-mitigation-grant-program)
- Repetitive Flood Claims (RFC) − a grant that FEMA administers for certain repetitive loss properties where there is no local government sponsor (https://www.fema.gov/media-library-data/20130726-1621-20490-8359/rfc_08_guidance_final_10_30_07.pdf)
- Severe Repetitive Loss (SRL) − a grant that is reserved for "Severe" repetitive loss properties, i.e., those with their flood insurance policies administered by FEMA's Special Direct Facility rather than a private insurance company (https://www.fema.gov/pdf/nfip/manual201205/content/20_srl.pdf)

- Increased Cost of Compliance (ICC) − an extra flood insurance claim payment that can be provided if an insured building was flooded and then declared substantially damaged by the local permit office. (https://www.fema.gov/increased-cost-compliance-coverage)
- Small Business Administration (SBA) − low interest loans that can fund repairs and mitigation projects for residential and nonresidential buildings following a disaster declaration (https://www.disasterassistance.gov/get-assistance/forms-of-assistance/4479/0/D05)

Most of the FEMA grants provide 75% of the cost of a project. The owner is expected to fund the other 25%, although in some cases the state or local government may contribute to the non-FEMA share. ICC pays 100% (up to $30,000) of the cost of bringing the damaged building up to the local ordinance's flood protection standards.

Each program has a different Congressional authorization and slightly different rules. These are summarized in Figure 7-13. States and communities set their own priorities for the use of the grant funds, but they are strongly encouraged to address their repetitive flood problems. In no case can a FEMA grant be used on a project without the voluntary agreement of the owner.

7.9.2 State Programs: The Illinois Department of Natural Resources, Office of Water Resources, has had a mitigation assistance program that has been used to acquire buildings located in floodways. There are no formal rules and regulations on this program. It is possible that if floodproofing were shown to be cost effective, the program might be used to protect floodway properties instead of buying them.

Figure 7-13 Federal Funding Sources

Types of Projects Funded	HMGP	FMA	PDM	RFC	SRL	ICC	SBA
Acquisition of the entire property by a gov't agency	✓	✓	✓	✓	✓		
Relocation of the building to a flood free site	✓	✓	✓	✓	✓	✓	
Demolition of the structure	✓	✓	✓	✓	✓	✓	✓
Elevation of the structure above flood levels	✓	✓	✓	✓	✓	✓	✓
Mitigation Reconstruction	✓	✓	✓				✓
Local drainage and small flood control projects	✓	✓	✓	✓			
Dry floodproofing (nonresidential buildings only)	✓	✓	✓	✓		✓	✓
Percent paid by Federal program	75%	75%	75%	100%	75%	0	0
Application notes	1, 2	1	1		1	3	2, 4

Application notes:
1. Requires a grant application from the local government
2. Only available after a Federal disaster declaration
3. Requires the building to have a flood insurance policy and to have been flooded to such an extent that the local government declares it to be substantially damaged
4. This is a low interest loan that must be paid back

7.9.3 Use in the Area: Calumet City and several Will and DuPage County communities have used FEMA grants. In 1983 and 1986, FEMA purchased 15 properties along the Little Calumet River (see Figure 7-1).

The Illinois Department of Transportation, Division of Water Resources' mitigation assistance program has been used mostly on the Illinois River. A few properties in Wood Dale, Addison, Elmhurst, Oak Brook, and Plainfield have been purchased.

After the 1996 Chicago suburban flood, more funds were made available. State priorities limited the use of the funds to acquisition of residential buildings. Only one building in South Holland appeared to be appropriate for the program, but it was a commercial property and could not compete with residences that fell higher on the State's priority list.

7.9.4 Community Funding Arrangements: Most of the Federal and state programs have their own requirements as to how the money is used to protect a property. However, communities have more discretion in how they use their own funds. This section reviews alternative arrangements for how local funds could be administered.

Community Built Project: As with public works projects, the Village could design and manage the construction project and pay the contractors directly. This approach can add a great deal of overhead cost when there are many little projects on different properties. This approach has been used in Prince George's County, Maryland, where floodwall and dry floodproofing projects cost in the neighborhood of $30,000.

This arrangement is the most expensive one. The Village must do all the preparations, plans, and administrative work. Because of direct government involvement, the project may be more expensive due to prevailing wage laws and the desire for architect or engineering plans. However, this is the only feasible approach for acquisition.

100% Grants: This approach is used by many local community development or housing improvement agencies for their rehab programs. Under a contract between the property owner and the contractor, the local agency does not have to meet Federal requirements for public projects. It does not pay prevailing wages and it avoids direct liability for the work. On the other hand, the community is able to help the owner through the complicated process of writing plans, selecting a qualified contractor, and inspecting the work.

Cost Sharing: Cost sharing has two benefits. First, it makes the Community's funds go farther. Second, it gives the property owner a stake in the project. It is generally understood that by having an investment in floodproofing, the owner will have an incentive to make sure that it is properly maintained. The owner's share should be large enough to be a meaningful investment but not so large that the owner cannot afford to floodproof.

The community development and housing improvement agencies' funding arrangements accommodate cost sharing. The owner's share is put in the same escrow account before the contract is signed. If the owner's share is very large, as with multi-family building projects, a letter of credit is obtained from a bank. The owner has an approved loan, but does not have to borrow all of the principal before it is needed.

Soft Match: A variation on the cost share is a "soft match" by the owner. Instead of a cash contribution, the owner would donate labor or something else to the project. If a floodwall protects several homes, the owner of the property might donate the land and the fill dirt.

Another example would be an owner who cannot afford to pay his or her share of elevating a house in cash up front. Instead, after the house is elevated, the owner builds the stairs and does the landscaping over the next few months. Under this example, the owner contributes 15% - 20% of the total project cost. The community is assured that the flood protection parts of the project are done properly while it is up to the owner to make the property look good.

Loans: Low interest loans look attractive to a funding agency. Eventually, the funds will be repaid so they can be loaned out to floodproof other properties. Loans also avoid the challenge that the community is "giving" money to improve private property.

The problem with floodproofing loans is that not many people have taken advantage of them. They were tried in the 1980's by the states of Michigan and Illinois in pre-flood situations and there were few takers. A study of the Illinois' 2% loan program concluded that in spite of the low usage, low interest loans did help people and can be an appropriate source of financial assistance given the community's and property owners' resources.

Rebate: In the 1980's, the City of Des Plaines and the Village of Mount Prospect had very successful cost-sharing programs. They provided a "rebate" of 20% of the project cost or $1,000 (whichever was less) after property owners install floodproofing measures. Most of the measures have been related to sewer backup and flooded basements, so few rebates have been as high as $1,000.

Financial Advisor: A community paid counselor could help floodprone property owners learn about and apply for financial assistance from one or more of the numerous possible Federal, local, or private sources. For a relatively small investment (equal to the cost of elevating two houses), the Village could fund such a person for a year. That work could result in hundreds of thousands of dollars in outside funds going to help South Holland's floodplain residents.

7.9.5 Use in the Area: The 1994 *Plan* recommended, and the Village created, a Flood Assistance Program. Village funds were budgeted each year to provide 25% rebates toward the cost of an approved retrofitting project. In 2014, the Village introduced the Sewer Back Up Prevention Pilot Program, which provides 50% rebates to homeowners that elect to install overhead sewers, backflow devices or lift stations. These projects minimize the potential for sewer backups during a heavy rain event and to date 108 projects have been funded. Administered by the Flood Assistance Coordinator (who is also a financial advisor), these rebate programs have been quite a success. The program is summarized in Figure 7-16.

The rebates have promoted a variety of projects, most of them related to basement flooding and sewer backup (see Figure 7-15).

Figure 7-15 Rebate Projects

Project	Number
Drain tile system	323
Foundation crack repairs	689
Overhead sewers	135
Back up sumps	42
Sewer back up valves	56
Dewatering systems	14
Mud jacking	5
Other floodproofing	57
Total	1,321

As the numbers show, the rebate program has proven to be very successful. It has received state and national awards and has been written up in national publications.

Figure 7-14 Rebate Financing

Year	Number Of Projects	Value Of Projects	Rebate (Village's Share)
1995	70	$206,304	$49,826
1996	67	143,280	35,820
1997	84	182,341	45,585
1998	74	123,629	30,907
1999	55	74,170	18,543
2000	58	80,471	20,118
2001	50	73,739	18,435
2002	33	29,197	7,299
2003	67	67,862	16,967
2004	70	116,084	29,021
2005	43	81,123	29,281
2006	51	90,753	22,688
2007	54	132,247	33,062
2008	92	218,136	54,534
2009	73	145,204	36,301
2010	46	87,544	21,886
2011	37	74,038	18,510
2012	14	34,194	8,548
2013	66	190,464	74,616
2014	45	112,893	28,223
2015	18	38,534	9,634
2016	59	99,654	24,913
2017	95	110,974	27,743
Total	1321	$2,512,835	$662,460

Figure 7-16 Rebate Program Details

Objective: To promote and encourage flood awareness to residents of the Village of South Holland, so that proper steps may be taken to prevent future problems within the home, while providing financial assistance to encourage flood control projects to be completed.

Flood Assistance Rebate Details: This program is designed to offer residents a 25% rebate on flood control projects, with a maximum rebate of $2500.00 per home.

Flood Assistance Qualifying Projects:

- → Repair of foundation cracks
- → Waterproofing of foundation walls
- → Installation of drain tiles
- → Diversion of downspouts
- → Construction of flood walls
- → Removal of sump pump and downspout connectors from sanitary sewers
- → Elevation of landscaping for improved drainage
- → Additional projects may qualify

Flood Assistance Rebate Requirements:

- → All projects must be pre-approved by the Village
- → Property must be owner occupied
- → An application must be completed prior to approval
- → Two bid proposals are required

Sewer Back Up Prevention Rebate Details: This program is designed to offer residents a 50% rebate on flood control projects that prevent sewer backups, with a maximum rebate of $5000.00 per home.

Sewer Backup Prevention Qualifying Projects:

- → Installation of overhead sewers
- → Installation of backflow devices and lift stations

Sewer Backup Prevention Rebate Requirements:

- → Sump pump and downspout connections must be separate from the sanitary sewer
- → All projects must be pre-approved by the Village
- → Property must be owner occupied
- → An application must be completed prior to approval
- → Two bid proposals are required

Residents who desire to apply for the Flood Rebate Program are encouraged to call for details.
If you have any questions regarding this program, please call us at 708-210-2915.

− http://www.southholland.org

7.10 Conclusions and Recommendations

7.10.1 Conclusions:

a. There are a variety of flood protection measures that can be implemented to protect individual buildings from surface flooding and sewer backup.

b. Many of the measures can be installed by the owner or by a contractor at relatively little cost to the owner. The most effective sewer backup protection measures cost $9,000 to $17,000 per building. Surface flooding protection measures can cost in excess of $100,000, but many buildings with basements can be retrofitted to protect them from shallow flooding for less than $10,000.

c. There are a variety of ways the Village can assist property owners implement protection measures, ranging from providing information and technical assistance to cost sharing to fully funding the design and construction.

d. Many types of projects can be funded at a low cost, so a relatively small amount of financial assistance could help protect many properties.

e. The Village's rebate program has proven quite successful, leading to over 1,300 surface and sewer flooding protection projects. It has also bred goodwill and helped to improve relations between residents and Village staff.

7.10.2 Recommendations:

The Village should continue its Flood Assistance Program to help floodprone property owners take steps to reduce flood damage. The program should continue to be administered by a Village staff person and would have three parts: general information, site-specific information and financial assistance.

a. Staff: The Flood Assistance Coordinator (FAC) position should continue. The position is currently staffed. If the position should become vacant at some point in the future, a potential candidate would need to meet the following qualifications and be able to complete the following duties:

    1) Qualifications: The person hired for the FAC should have a working knowledge of building construction, be able to work with people, and be able to learn the details of floodproofing and government financial assistance programs.

    2) Duties: The FAC should be responsible for:

        – Administering the activities recommended by this plan,

        – Attending training on floodproofing, financial assistance and post-flood mitigation programs,

        – Collecting, reading and becoming familiar with appropriate references on these topics,

– Reporting on the progress of the Flood Assistance Program and implementation of this plan to the Flood Liaison Committee, and

– All other flood-related issues, including stream maintenance.

3) Budget: The Village should provide an adequate budget to pay the FAC's salary, expenses, and training. Because there are few training programs or communities with similar programs, the budget should include funds for travel to other communities and conferences in other parts of the country.

4) Technical Support: The Village should provide the FAC with engineering and technical support on floodproofing and government programs.

a. Financial Assistance: The FAC should be responsible for administering the financial assistance aspects of the Flood Assistance Program.

1) Financial Assistance Advice: The FAC should research and become familiar with outside sources of financial assistance, including disaster assistance programs. He or she should follow developments in federal and state programs to capitalize on any new opportunities and pilot programs.

2) Flood Assistance Fund: The FAC should administer the Village's Flood Assistance Fund. The current criteria, as listed in Figure 7-12, should continue to be followed.

a) Publicity: The Village should publicize the rebate and loan programs well before they begin so that all residents have an equal chance of applying.

a) Amount: Rebates should be made available to cover 25% of the cost of a flood protection project in an amount not to exceed $2,500.

3) Project costs: The amount of a rebate or loan should be based on the total "out of pocket" cost of the project, i.e., the cost of the contractor and/or supplies. There should be no "soft matches" or basing the cost of the project on the property owner's labor or donated materials.

7.11 References

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